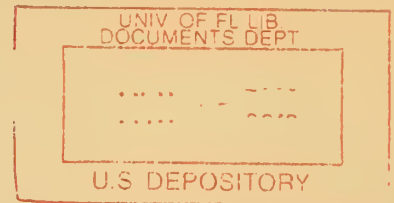


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UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics



UTILIZATION OF TRACTORS AND COST OF TRACTOR POWER
ON GRAIN FARMS

(Northern Great Plains and Pacific Northwest, 1933)

By R. S. Washburn, Assistant Agricultural Economist,

and

R. S. Kifer, Senior Agricultural Economist

Washington, D. C.
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INTRODUCTION

Successive years of low farm incomes have seriously reduced the resources of many farmers in the spring wheat regions of the Northern Great Plains and of the Pacific Northwest. Because of the need for adjustment in the organization and operation of grain farms in these regions and in the light of changing economic conditions, information with reference to farm organization and farming practice was obtained.

The study was made in April, May, and June of 1934 and, for the most part, applies to the crop year 1933. The field data were obtained by personal interviews with 1,674 farm operators in grain producing areas of the Northern Great Plains and of the Pacific Northwest. The farming areas surveyed, shown in figure 1, are those outlined in United States Department of Commerce, Bureau of the Census Bulletin, "Types of Farming in the United States". The farmers interviewed gave detailed information on the organization and operation of their farms, such as acreage of wheat and other crops grown; a history

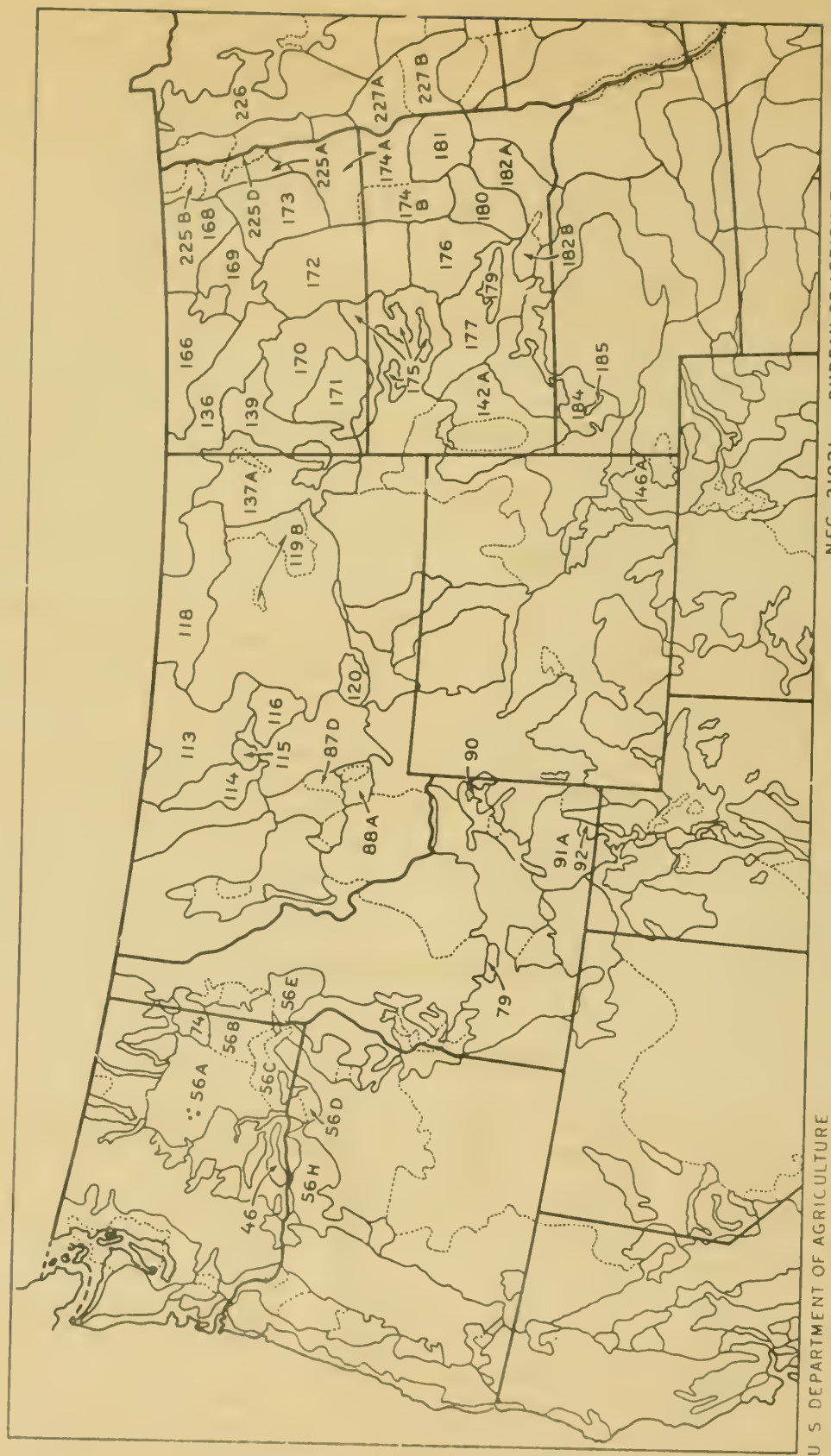


FIGURE 1.- TYPE-OF-FARMING AREAS WHERE STUDY WAS MADE OF THE UTILIZATION OF TRACTORS AND COST OF TRACTOR POWER ON GRAIN FARMS. (AREAS ARE THOSE OUTLINED IN UNITED STATES DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS BULLETIN, "TYPES OF FARMING IN THE UNITED STATES, 1930").

of crop yields over a period of years; the practices employed in the production of wheat and other crops; numbers and kinds of livestock; kinds and quantities of livestock products; an inventory of the kinds and quantity of equipment on the farm; the duty of farm machinery and the cost of operating power equipment.

As the study aimed to show the methods of growing and harvesting crops, particularly wheat, the sample of farms may show a larger acreage of wheat and a higher proportion of the land in crops than would a county average. No particular effort was made for any other selection, however, and it is believed that the records obtained are typical of grain farms in the type-of-farming areas studied.

In certain sections of the Northern Great Plains, particularly western North Dakota, eastern Montana, and in many areas of South Dakota, conditions of extreme drought prevailed in 1933. As a result very little harvest was reported in these drought areas and the harvest work done with power equipment was abnormal. The use of equipment in a normal season rather than that reported in 1933 has been used in calculating the cost of operating power equipment.

In many areas the use of large scale power equipment was common and constituted a large part of the farm expense. For this reason a series of reports dealing with farm equipment is being published.

The purpose of the present report is to show the extent to which tractors are used for farm power, the type and size of tractors in use, the kinds of work done and the cost of using tractors on representative farms in the grain-producing sections of the Northern Great Plains and of the Pacific Northwest. The other publications in the machinery series are;

1. Utilization of combined harvester-threshers and cost of harvesting small grains with a combine (Northern Great Plains and Pacific Northwest, 1933).
2. Cost of operating farm motor trucks on grain farms (Northern Great Plains and Pacific Northwest, 1933).
3. Tillage, planting, and harvesting equipment on grain farms and rates of doing field work with these implements when drawn with horse and with tractor power (Northern Great Plains and Pacific Northwest).

NUMBER AND SIZE OF FARMS HAVING TRACTORS AND NUMBER AND SIZE OF FARMS NOT HAVING TRACTORS BY TYPE-OF-FARMING AREAS

Tractors were used in all of the grain-producing areas surveyed in the Northern Great Plains (table 1). They are the chief source of power for field work on many of the larger wheat farms in the more westerly areas. On the smaller general farms in the eastern areas of the region, horses were used for certain kinds of field work and on many of these farms horses were the only source of power for field work. The proportion of farmers using tractors, according to this sample, varied from 25 percent in a general farming

Table 1. - Number and size of farms having tractors and number and size of farms not having tractors, by type-of-farming areas, Northern Great Plains, 1933

State and type-of-farming: area	Farms having tractors		Farms not having tractors		All farms	
	Farms	Crop area:	Farms	Crop area:	Farms	Crop area:
	studied	per farm	studied	per farm	studied	per farm
	Number	Acres	Number	Acres	Number	Acres
Minnesota	:	:	:	:	:	:
225A	29	330	14	255	43	305
226	4	308	12	110	16	160
225D	15	373	5	205	20	331
227A	16	276	9	189	25	245
227B	13	251	16	161	29	201
North Dakota	:	:	:	:	:	:
225B	9	506	3	260	12	445
173	18	434	16	331	34	386
174A	35	445	17	231	52	375
168	26	623	14	302	40	511
169	24	579	12	342	36	500
172	28	415	27	256	55	346
170	25	292	12	262	37	282
171	35	497	13	261	48	473
136	51	509	19	195	70	424
139	16	505	3	207	19	458
166	33	552	7	249	40	499
South Dakota	:	:	:	:	:	:
181	16	391	16	232	32	311
182A	7	223	20	203	27	208
174B	20	445	11	267	31	382
180	16	350	14	198	30	279
176	34	649	7	253	41	581
179	15	598	4	179	19	510
182B	14	496	12	198	26	358
175	21	571	8	256	29	484
142A-177	24	473	3	226	27	446
Nebraska	:	:	:	:	:	:
184	33	407	14	222	47	352
185	20	712	2	202	22	665
Montana	:	:	:	:	:	:
137A	18	396	16	279	34	341
119B	17	716	6	297	23	606
118	22	408	7	252	29	370
113	48	740	2	242	50	720
114	44	557	2	224	46	543
115	26	1094	-	-	26	1094
116	36	511	5	238	41	478
87D	8	525	14	195	22	315
89A	24	478	18	260	42	384
120	13	662	7	188	20	496
Wyoming	:	:	:	:	:	:
146A	29	690	1	400	30	680
Total or average	882	523	388	238	1270	436

area of Minnesota to 100 percent in one of the wheat areas of Montana. In Minnesota and in the eastern part of North Dakota and South Dakota about 50 percent of the farms had tractors; in the central and western parts of the Dakotas, about 70 percent; and in Montana, northeastern Wyoming, and northwestern Nebraska about 80 percent were tractor farms. For the entire region 69 percent of the farmers enumerated used tractors whereas 31 percent did not. In all areas the crop acreage per farm on farms where tractors were used exceeded the crop acreage on farms using only horses for field work. Because of the tendency toward the greater use of tractor power in the areas of large wheat farms the crop acres per farm averaged 120 percent larger on farms having tractors than on farms not having tractors.

In the Pacific Northwest, tractors were used in all areas but the number of non-tractor farms in most areas exceeded the number of farms having tractors (table 2). For the region as a whole, 42 percent of the farm operators used tractors whereas 58 percent did not. The average crop acreage per farm was 95 percent larger on farms having tractors than on non-tractor farms. Farms having tractors as well as non-tractor farms in this region are larger than farms in the Northern Great Plains. In addition, the proportion of farms not having tractors to those reporting tractors far exceeds that of the Northern Great Plains. This is largely due to the fact that the topography of much of the crop area of the Pacific Northwest is very rolling which makes a tractor, especially the high-wheel type, less adapted for field work than on the level to slightly rolling crop land that prevails in the Northern Great Plains.

Table 2. - Number and size of farms having tractors, and number and size of farms not having tractors, by type-of-farming areas, Pacific Northwest, 1933

State and type-of-farming: area	Farms having tractors		Farms not having tractors		All farms	
	Farms	Crop area	Farms	Crop area	Farms	Crop area
	studied	per farm	studied	per farm	studied	per farm
	Number	Acres	Number	Acres	Number	Acres
Oregon	:	:	:	:	:	:
56H	19	1694	22	840	41	1236
56D	26	1207	4	1132	30	1197
Washington	:	:	:	:	:	:
46	17	1372	15	935	32	1167
56C	10	2652	51	907	41	1332
56A	25	1503	38	792	63	1074
56B	21	539	37	357	58	423
74	9	457	15	274	24	342
Idaho	:	:	:	:	:	:
56E	8	787	25	416	33	506
79	10	1032	5	275	15	779
90	10	790	13	719	23	750
91A	8	705	21	339	29	440
92A	8	480	7	276	15	385
Total or average	171	1193	235	613	404	849

CROPS PRODUCED ON FARMS HAVING TRACTORS AND NUMBER AND SIZE OF TRACTORS BY TYPE-OF-FARMING AREAS

In the Northern Great Plains on farms where tractors were used, the proportion of the crop area utilized for the production of different crops varied to a considerable extent in, as well as between, different type-of-farming areas. The agriculture of the region, however, may be classified as primarily a cash grain type-of-farming with wheat the major crop. An examination of table 3 shows that proportionately more of the total crop area was devoted to wheat and summer fallow in central and western Montana and northeastern Wyoming than in the other areas studied. In northeastern Wyoming about 15 percent of the crop area was devoted to corn. Proceeding eastward a rather decided change in cropping practice began to appear. Instead of alternating wheat with summer fallow the common practice was to grow wheat in combination with corn, oats, and barley. In eastern Montana and northwestern and north central North Dakota, wheat was the principal crop grown, with moderate acreages of oats, barley, and corn. These crops and summer fallow accounted for most of the crop acreage. In southwestern North Dakota, western South Dakota, and northwestern Nebraska, wheat was still the dominant crop but the acreage devoted to corn, oats, and barley showed a considerable increase over that of eastern Montana and northwestern and north central North Dakota. In south central North Dakota and central South Dakota wheat still held first rank but acreages of oats and barley and especially corn in central South Dakota were of increasing importance. In eastern North Dakota and South Dakota and western Minnesota wheat occupied from 20 to 50 percent of the crop area with barley, oats, and corn making up most of the balance. The greatest concentration of corn acreage was in eastern South Dakota and southwestern Minnesota. In addition sweet clover, alfalfa, and flax were of considerable importance in western Minnesota and on some farms potatoes were produced on a commercial scale.

In the northern Great Plains tractors of 15-to 17-drawbar horsepower of the ordinary high-wheel type were the most common and were followed in order by those of 8-to 12-drawbar horsepower. General purpose tractors of 9-to 12-drawbar horsepower were quite common in those areas of South Dakota and Nebraska where row crops were grown to a considerable extent. Tractors of the track-laying type were reported only in Montana.

In the Pacific Northwest wheat for grain was the principal crop, table 4. It was alternated with summer fallow. Wheat, together with summer fallow, comprised most of the crop acreage except in area 56B in eastern Washington, where peas were of considerable importance, area 74 in eastern Washington where oats were grown to a considerable extent, and area 92A in southern Idaho where the acreage in alfalfa was quite large.

Tractors in the Pacific Northwest were considerably larger than those in the Northern Great Plains. Because of the rolling topography the track-laying type of tractor was the one in common use. Those of 25-drawbar horsepower were the most common size. A few high-wheel tractors were in use, especially on farms where the topography was fairly level. Where high-wheel tractors were used those of 15-drawbar horsepower were the most common size.

Table 3. - Number and size of farms reporting tractors, and number, size and type of tractors by type-of-farming areas, Northern Great Plains, 1933 1/

State and type: of farming area	Average:		Crop area per farm					
	Farms	size of:	Wheat	Row	Other	Summer	Idle	Total
	studied:	farms						
	Number	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Minnesota								
225A	20	374	113	29	154	27	2	325
226	4	460	71	15	210	12	-	308
225D	11	477	142	35	193	34	-	404
227A	15	348	61	101	124	1	-	287
227B	10	321	66	93	104	6	2	271
North Dakota								
225B	8	702	175	17	263	94	2	551
173	16	635	228	27	148	39	14	456
174A	34	708	187	77	183	18	-	465
168	22	824	312	4	255	114	1	686
169	21	769	411	7	112	58	6	594
172	22	748	239	30	135	16	6	426
170	24	586	162	32	87	-	1	282
171	34	878	340	39	120	2	5	506
136	50	741	329	16	96	53	9	503
139	16	792	353	14	54	67	17	505
166	33	674	253	28	130	60	81	552
South Dakota								
181	14	528	109	68	219	10	6	412
182A	7	319	54	90	79	-	-	223
174B	18	675	175	93	164	1	5	438
180	16	594	102	134	109	3	2	350
176	33	1273	256	137	237	17	7	654
179	15	2086	364	76	153	-	5	598
182B	14	611	281	83	132	-	-	496
175	20	1043	356	59	129	4	18	566
142A-177	24	918	244	126	88	1	14	473
Nebraska								
184	32	714	171	110	108	12	14	415
185	20	817	293	198	168	43	10	712
Montana								
137A	18	646	248	36	67	25	20	396
119B	16	1187	523	16	120	78	7	744
118	21	895	227	9	58	49	49	392
113	47	1285	424	5	80	202	44	755
114	44	727	284	-	57	210	6	557
115	26	1274	583	2	47	454	8	1094
116	36	632	351	3	23	123	11	511
87D	8	958	205	-	61	232	27	525
88A	24	667	218	-	34	226	-	478
120	13	2095	392	14	40	206	10	662
Wyoming								
146A	29	1031	296	106	77	207	4	690
Total or average	835	842	277	48	114	82	13	534

Table 3. - Number and size of farms reporting tractors, and number, size and type of tractors by type-of-farming areas, Northern Great Plains, 1933 1/ Continued

State and type of farming area	Average:		Proportion of crop area per farm						
	Farms studied	size of farms	Row	Other	Summer	Idle	Total		
	Number	Acres	Percent	Percent	Percent	Percent	Percent	Percent	
Minnesota	:	:	:	:	:	:	:	:	:
225A	: 20	: 374	: 34.8	: 8.9	: 47.4	: 8.3	: 0.6	: 100	
226	: 4	: 460	: 23.0	: 4.9	: 68.2	: 3.9	: -	: 100	
225D	: 11	: 477	: 35.1	: 8.7	: 47.8	: 8.4	: -	: 100	
227A	: 15	: 348	: 21.3	: 35.2	: 43.2	: .3	: -	: 100	
227B	: 10	: 321	: 24.4	: 34.3	: 38.4	: 2.2	: 0.7	: 100	
North Dakota	:	:	:	:	:	:	:	:	:
225B	: 8	: 702	: 31.8	: 3.1	: 47.7	: 17.0	: 0.4	: 100	
173	: 16	: 635	: 50.0	: 5.9	: 32.5	: 8.5	: 3.1	: 100	
174A	: 34	: 708	: 40.2	: 16.6	: 39.3	: 3.9	: -	: 100	
168	: 22	: 824	: 45.5	: 0.6	: 37.2	: 16.6	: 0.1	: 100	
169	: 21	: 769	: 69.2	: 1.2	: 18.3	: 9.8	: 1.0	: 100	
172	: 22	: 748	: 56.1	: 7.0	: 31.7	: 3.8	: 1.4	: 100	
170	: 24	: 586	: 57.4	: 11.3	: 30.9	: -	: 0.4	: 100	
171	: 34	: 878	: 67.2	: 7.7	: 23.7	: 0.4	: 1.0	: 100	
136	: 50	: 741	: 65.4	: 3.2	: 19.1	: 10.5	: 1.8	: 100	
139	: 16	: 792	: 69.9	: 2.8	: 10.7	: 13.3	: 3.3	: 100	
166	: 33	: 674	: 45.8	: 5.1	: 23.5	: 10.9	: 14.7	: 100	
South Dakota	:	:	:	:	:	:	:	:	:
181	: 14	: 528	: 26.5	: 16.5	: 53.1	: 2.4	: 1.5	: 100	
182A	: 7	: 319	: 24.2	: 40.4	: 35.4	: -	: -	: 100	
174B	: 18	: 675	: 40.0	: 21.2	: 37.5	: 0.2	: 1.1	: 100	
180	: 16	: 594	: 29.1	: 38.3	: 31.1	: 0.9	: 0.6	: 100	
176	: 33	: 1273	: 39.1	: 21.0	: 36.2	: 2.6	: 1.1	: 100	
179	: 15	: 2086	: 60.9	: 12.7	: 25.6	: -	: 0.8	: 100	
182B	: 14	: 611	: 56.7	: 16.7	: 26.6	: -	: -	: 100	
175	: 20	: 1043	: 62.9	: 10.4	: 22.8	: 0.7	: 3.2	: 100	
142A-177	: 24	: 918	: 51.6	: 26.6	: 18.6	: 0.2	: 3.0	: 100	
Nebraska	:	:	:	:	:	:	:	:	:
184	: 32	: 714	: 41.2	: 26.5	: 26.0	: 2.9	: 3.4	: 100	
185	: 20	: 817	: 41.2	: 27.8	: 23.6	: 6.0	: 1.4	: 100	
Montana	:	:	:	:	:	:	:	:	:
137A	: 18	: 646	: 62.6	: 9.1	: 16.9	: 6.3	: 5.1	: 100	
119B	: 16	: 1187	: 70.3	: 2.2	: 16.1	: 10.5	: .9	: 100	
118	: 21	: 895	: 57.9	: 2.3	: 14.8	: 12.5	: 12.5	: 100	
113	: 47	: 1285	: 56.2	: 0.7	: 10.6	: 26.7	: 5.8	: 100	
114	: 44	: 727	: 51.0	: -	: 10.2	: 37.7	: 1.1	: 100	
115	: 26	: 1274	: 53.3	: 0.2	: 4.3	: 41.5	: 0.7	: 100	
116	: 36	: 632	: 68.7	: 0.6	: 4.5	: 24.1	: 2.1	: 100	
87D	: 8	: 958	: 39.1	: -	: 11.6	: 44.2	: 5.1	: 100	
88A	: 24	: 667	: 45.6	: -	: 7.1	: 47.3	: -	: 100	
120	: 13	: 2095	: 59.2	: 2.1	: 6.1	: 31.1	: 1.5	: 100	
Wyoming	:	:	:	:	:	:	:	:	:
146A	: 29	: 1031	: 42.9	: 15.4	: 11.1	: 30.0	: 0.6	: 100	
Total or average	: 835	: 842	: 51.9	: 9.0	: 21.3	: 15.4	: 2.4	: 100	

Table 3. - Number and size of farms reporting tractors, and number, size, and type of tractors by type-of-farming areas, Northern Great Plains, 1933 1/ Continued

		:Aver-:		Size of tractors (Drawbar horsepower)													
State and:	Farms:	age :	General :														
type-of-	stud-:	size :	purpose :	Ordinary high-wheel						Track-laying						Tot-	
farming	ied :	of :	9-12: 15 :	8-12: 15-17:	18-21: 22-25:	26-28: 35-40:	20 :	25 :	39 :	50 :	al						
area	:	farms:	H.P.:H.P.:H.P.:H.P.:H.P.:H.P.:H.P.:H.P.:H.P.:H.P.:H.P.:H.P.:														
		:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:	:Num-:			
		ber :	Acres:	ber :	ber :	ber :	ber :	ber :	ber :	ber :	ber :	ber :	ber :	ber :			
Minnesota:																	
225A	:	20:	374:	- :	- :	12:	8:	1:	- :	- :	- :	- :	- :	- :	21		
226	:	4:	460:	- :	- :	2:	1:	1:	- :	- :	- :	- :	- :	- :	4		
225D	:	11:	477:	- :	- :	5:	8:	1:	1:	- :	- :	- :	- :	- :	12		
227A	:	15:	348:	3 :	- :	9:	5:	1:	- :	- :	- :	- :	- :	- :	18		
227B	:	10:	321:	1 :	- :	6:	3:	- :	- :	1 :	- :	- :	- :	- :	11		
No. Dak.																	
225B	:	8:	702:	- :	- :	4:	4:	3:	- :	- :	- :	- :	- :	- :	11		
173	:	16:	635:	1 :	- :	4:	7:	3:	2 :	- :	- :	- :	- :	- :	17		
174A	:	34:	708:	4 :	- :	14:	13:	3:	1 :	2 :	- :	- :	- :	- :	37		
168	:	22:	824:	- :	- :	2:	14:	5:	- :	1 :	- :	- :	- :	- :	22		
169	:	21:	769:	- :	- :	1:	15:	6:	1 :	2 :	- :	- :	- :	- :	25		
172	:	22:	748:	- :	- :	3:	13:	4:	1 :	1 :	- :	- :	- :	- :	22		
170	:	24:	586:	- :	- :	10:	9:	5:	1 :	- :	- :	- :	- :	- :	25		
171	:	34:	878:	- :	- :	7:	20:	9:	- :	3 :	- :	- :	- :	- :	39		
136	:	50:	741:	- :	- :	6:	34:	11:	1 :	5 :	- :	1 :	1 :	- :	57		
139	:	16:	792:	- :	- :	5:	9:	1:	1 :	1 :	- :	- :	- :	- :	17		
166	:	33:	674:	- :	- :	5:	23:	4:	2 :	- :	- :	- :	- :	- :	34		
So. Dak.																	
181	:	14:	528:	3 :	2 :	- :	5:	2:	1 :	2 :	1 :	- :	- :	- :	16		
182A	:	7:	319:	2 :	- :	3:	2:	- :	- :	- :	- :	- :	- :	- :	7		
174B	:	18:	675:	7 :	- :	5:	4:	2:	1 :	- :	- :	- :	- :	- :	19		
180	:	16:	594:	8 :	- :	3:	2:	5:	- :	- :	- :	- :	- :	- :	18		
176	:	33:	1273:	17 :	- :	12:	7:	6:	6 :	- :	- :	- :	- :	- :	48		
179	:	15:	2086:	2 :	- :	7:	9:	1:	1 :	- :	- :	- :	- :	- :	19		
182B	:	14:	611:	4 :	1 :	6:	3:	- :	- :	- :	1 :	- :	- :	- :	15		
175	:	20:	1043:	6 :	- :	- :	13:	3:	3 :	- :	- :	- :	- :	- :	25		
142A-177	:	24:	918:	9 :	- :	13:	6:	3:	- :	- :	- :	- :	- :	- :	31		
Nebraska																	
184	:	32:	714:	7 :	- :	5:	20:	1:	1 :	- :	- :	- :	- :	- :	34		
185	:	20:	817:	5 :	1 :	3:	12:	5:	1 :	- :	- :	- :	- :	- :	27		
Montana																	
137A	:	18:	646:	- :	- :	4:	16:	1:	- :	- :	- :	- :	- :	- :	21		
119B	:	16:	1187:	1 :	- :	1:	13:	3:	1 :	2 :	- :	- :	- :	- :	21		
118	:	21:	895:	- :	- :	1:	13:	7:	1 :	- :	- :	- :	- :	- :	22		
113	:	47:	1285:	1 :	- :	2:	40:	10:	2 :	1 :	- :	- :	2 :	- :	58		
114	:	44:	727:	- :	- :	2:	25:	14:	2 :	5 :	- :	1 :	2 :	- :	52		
115	:	26:	1274:	- :	- :	- :	12:	4:	2 :	5 :	- :	- :	3 :	1 :	30		
116	:	36:	632:	- :	- :	3:	26:	5:	- :	5 :	- :	2 :	- :	- :	41		
87D	:	8:	958:	- :	- :	2:	6:	- :	- :	- :	- :	- :	- :	- :	8		
88A	:	24:	667:	- :	- :	2:	22:	4:	- :	- :	- :	- :	- :	- :	28		
120	:	13:	2095:	3 :	- :	- :	12:	- :	- :	- :	- :	- :	- :	- :	15		
Wyoming																	
146A	:	29:	1031:	2 :	- :	4:	20:	3:	4 :	1 :	- :	- :	- :	- :	34		
Total or																	
average	:	835:	842:	86 :	4 :	173:	471:	137:	36 :	35 :	2 :	4 :	8 :	1 :	961		

1/ The number of reports shown in this table as well as in all succeeding tables for the Northern Great Plains is somewhat less than that in table 1 for the reason that tractors used solely for belt work as well as a limited number with incomplete data on one or more items of costs were omitted.

Table 4. - Number and size of farms reporting tractors, and number, size, and type of tractors by type-of-farming areas, Pacific Northwest, 1933 1/

State and type-of-farming area	Farm size	Crop area per farm						Proportion of crop area per farm					
		Aver-		Sum-		Tot-		Row		Other		mer	
		age	size	Row	Other	mer	Idle	Wheat	crops	crops	fall	Idle	all
ied	of	farm	farm	low	low	low	low	Wheat	crops	crops	fall	Idle	all
Num-	ber	Acres	Acres	Acres	Acres	Acres	Acres	cent	cent	cent	cent	cent	cent
Oregon													
56H	17	2086	695	-	14	747	9	1465	47.4	-	1.0	51.0	0.6
56D	25	1397	585	-	42	555	-	1182	49.5	-	3.6	46.9	-
Wash.													
46	13	1958	747	-	35	606	22	1470	50.8	-	2.4	45.3	1.5
56C	9	3383	1496	-	3	1615	-	3114	48.0	-	.1	51.9	-
56A	18	1427	685	-	9	644	-	1338	51.2	-	.7	48.1	-
56B	19	654	276	3	136	149	-	564	49.0	0.5	24.1	26.4	-
74	9	601	182	12	81	176	6	457	39.9	2.6	17.7	38.5	1.3
Idaho													
56E	3	687	245	-	23	227	-	495	49.5	-	4.6	45.9	-
79	9	1347	507	-	63	465	66	1101	46.1	-	5.7	42.2	6.0
90	10	976	382	-	3	323	82	790	43.3	-	.4	40.9	10.4
91A	7	913	364	-	50	289	-	703	51.8	-	7.1	41.1	-
92A	7	625	234	-	40	213	2	489	47.8	-	8.2	43.6	.4
Total or													
Average	146	1401	563	1	45	530	13	1152	48.9	.1	3.9	46.0	1.1
State and type-of-farming area	Farm size	Size of tractor (drawbar horsepower)											
		Ordinary high-wheel						Track-laying				Total	
		10	15	18	20	22	26	20	25	39	50	tractors	
ied	of	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.		
area	farm	Num-	ber	Num-	ber	Num-	ber	Num-	ber	Num-	ber	Num-	
ber	Acres	ber	ber	ber	ber	ber	ber	ber	ber	ber	ber	ber	
Oregon													
56H	17	2086		6			1		8		5		20
56D	25	1397		1				1	15		2		27
Wash.													
46	13	1958	2	2		1		1	8				14
56C	9	3383							7		7		14
56A	18	1427		2	1		1	2	7	3	2		13
56B	19	654	1	2				3	12	1	1		21
74	9	601	3	5				2	1				11
Idaho													
56E	3	687						2	1				3
79	9	1347	2	3	1			1	2		1		10
90	10	976		1	2			2	4		1		11
91A	7	913					1	3	2		1		7
92A	7	625		1				2	4				7
Total or													
Average	146	1401	2	23	4	1	3	2	19	71	9	23	163

1/ The number of reports shown in this table as well as in all succeeding tables for the Pacific Northwest is somewhat less than that in table 2, for the reason that tractors used solely for belt work as well as a limited number with incomplete data on one or more items of cost were omitted.

CROP AREA PER FARM ON FARMS HAVING TRACTORS, AND NUMBER, TYPE, AND SIZE OF TRACTORS

The number of tractors by size and type according to acreage in crops on farms reporting tractors for the Northern Great Plains is given in table 5. In this region there did not appear to be any decided relationship between crop acreage per farm and size of tractor. There was some tendency for the larger tractors, especially those of the track-laying type, to be found on the larger farms but a greater tendency for those farmers who are operators of large acreages to use two or more tractors of medium size rather than to invest in the larger tractors. For the most part those farmers with about 400 crop acres or less per farm had only one tractor whereas on quite a large percentage of the farms with a crop acreage in excess of this more than one tractor was owned. Fifty-four percent of all tractors enumerated were on farms of 500 crop acres or less, 33 percent were on farms of 501 to 1,000 crop acres, and 13 percent were on farms of over 1,000 crop acres.

In the Pacific Northwest where farms are larger than in the Northern Great Plains, the size of tractor increased somewhat with an increase in crop acreage, but not uniformly, the tendency being to use tractors of medium size regardless of crop acreage (table 6). Twenty-three percent of all tractors represented were on farms of 500 or less crop acres; 30 percent were on farms of from 501 to 1,000 crop acres; and 47 percent were on farms of over 1,000 crop acres.

KINDS OF TRACTOR WORK AND ANNUAL HOURS OF USE PER TRACTOR BY TYPE-OF-FARMING AREAS

The annual use of tractors in these areas is influenced largely by the number of crop acres per farm and kinds of crops grown.

In a few instances miscellaneous work performed with tractor power may have been overlooked in recording the work done with tractors on these farms, but for the most part the kinds and amounts of work performed with tractor power are accounted for in work of different kinds by type-of-farming areas as shown in tables 7 and 8.

A limited amount of tractor work in the Northern Great Plains consisted of corn shredding, corn shelling, and silo filling. When this work occurred it was recorded as "Corn harvest". Tractors in this region were used almost universally for preparation of seedbed, and to a large extent, for planting of crops. In addition tractors of the general purpose type were used quite extensively for cultivation of row crops. The harvest work was influenced largely by the method of harvesting the crop. In western Minnesota and in the eastern and central areas of North Dakota and South Dakota the work of tractors, except that of preparation of seedbed and planting, was mainly that of harvesting grain with a binder and threshing with a stationary thresher, and corn harvesting, whereas in the other types of farming areas, where harvesting with a combine was a common method and little corn was grown, the use of the tractor except for preharvest work was largely for harvesting and

Table 5. - Distribution of tractors of different sizes and types according to crop acres per farm, Northern Great Plains, 1933

Size group (crop acres)	Size (drawbar horsepower)												Total Tractors	
	All tractor farms	General purpose	Ordinary high-wheel											
			8-12 : 15	12-15 : 17	15-17 : 18	18-21 : 22	22-25 : 26	26-28 : 35	35-40 : 40	40 : 50	50 : 60	60 : 70		
	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber
50 and less	1		1											1
51 to 100	4		4											4
101 to 150	36	3	17	15	2									37
151 to 200	47	2	22	20	4									48
201 to 250	66	7	21	35	8									72
251 to 300	96	18	32	40	5									98
301 to 350	76	9	12	45	11									78
351 to 400	71	5	9	43	12									72
401 to 450	53	4	10	28	10									56
451 to 500	51	3	9	27	7									56
501 to 550	54	11	9	32	8									65
551 to 600	43	4	6	29	8									50
601 to 650	41	4	6	23	10									49
651 to 700	38	4	4	30	4									46
701 to 750	17	2	1	6	9									21
751 to 800	17			13	1									18
801 to 850	13	2	3	15	2									17
851 to 900	23	1			7									28
901 to 950	8		3	6	2									10
951 to 1000	13	2	3	4	2									14
1001 to 1100			2	10	2									19
1101 to 1200	6			7	3									11
1201 to 1300	5			6	3									12
1301 to 1400	8		1	6	1									13
1401 to 1500	5	3		2										8
1501 to 1600	5		1	2	3									9
1601 to 1700	2			1	2									4
1701 to 1800	6			5										7
1801 to 1900	1													1
1901 to 2000	1				1									2
2001 to 2200	4	1		2	2									7
2201 to 2400	5			5	4									10
2401 to 2600	1													1
2601 to 2800	1			3										3
2801 to 3000	2				7									8
3001 and over	2	1		2	1									6
Total	835	86	4	173	471	137	36	35	2	4	8	1	4	961

Table 6. - Distribution of tractors of different sizes and types according to crop acres per farm, Pacific Northwest, 1933

Size group (Crop acres)	All tractor: farms	Size (Drawbar horsepower)										Total tractors
		Ordinary high-wheel						Track-laying				
		10	15	18	20	22	26	20	25	39	50	
		H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	
	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber
200 and less	5	1	1					1	2			5
201 - 250	1	1										1
251 - 300	7	2	1				1	1	2			7
301 - 350	6	2	2					2	1			7
351 - 400	3							1	1	1		3
401 - 450	7		1					2	3	1		7
451 - 500	7		1	1				2	3			7
501 - 550	3	2							2			4
551 - 600	4							1	3			4
601 - 650	6							1	5			6
651 - 700	10		2	1				3	2	1	1	10
701 - 750	3		1					1	1			3
751 - 800	8			1		1		1	3	1	1	8
801 - 850	5			1			1	1	1		1	5
851 - 900	3		1						2			3
901 - 950	2								1	1		2
951 - 1000	3				1				2			3
1001 - 1100	3							1	2			3
1101 - 1200	4		1						2	1		4
1201 - 1300	6		3			1			2		2	8
1301 - 1400	1		1			1						2
1401 - 1500	9		4						2		3	9
1501 - 1600	2								3			3
1601 - 1700	3							1		1	1	3
1701 - 1800	5		3								2	5
1801 - 1900	2										2	2
1901 - 2000	9								10		1	11
2001 - 2200	2								2			2
2201 - 2400	1										1	1
2401 - 2600	8		1						5	1	2	9
2601 - 2800	4								2		2	4
2801 - 3000	1									1		1
3001 and over	3								7		4	11
Total	146	8	23	4	1	3	2	19	71	9	23	163

Table 7. - Estimated normal annual hours of use of tractors on work of different kinds by type-of-farming areas, Northern Great Plains

Home work												
State	and	Farms	Crop	Pre-plant	Com-	bine	Head	Bind	Thresh	Corn	Hay	Potato
type-of-	Tract-	having	area	and	bine	Head	Bind	Thresh	har-	har-	har-	Tot-
farming	ors	tract-	per	culti-	grain	grain	grain	grain	vest	vest	vest	al
areas	ors	farm	vate:									
	Number	Number	Acres	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota:												
225A	21	20	325	213	5	-	12	6	2	9	-	247
226	4	4	308	249	-	-	30	12	-	-	-	291
225D	12	11	404	248	26	-	10	13	2	-	-	299
227A	18	15	287	252	-	-	30	13	18	-	-	313
227B	11	10	271	259	-	-	42	11	14	-	-	326
No. Dak.:												
225B	11	8	551	301	31	-	45	23	-	1	-	401
173	17	16	456	352	7	-	47	26	-	4	-	436
174A	37	34	465	292	6	-	17	35	18	1	-	369
168	22	22	686	461	14	-	16	25	-	-	-	516
169	25	21	594	235	7	-	47	51	-	-	-	340
172	22	22	425	252	17	27	9	21	5	-	-	331
170	25	24	282	149	-	4	3	29	9	-	-	194
171	39	34	506	237	59	2	1	38	8	-	-	345
136	57	50	503	293	50	3	12	15	1	-	-	374
139	17	16	505	329	70	-	4	21	-	-	-	424
166	34	33	552	292	9	2	57	32	-	-	-	372
So. Dak.:												
181	16	14	412	242	17	-	53	32	15	6	-	365
182A	7	7	236	101	4	-	19	11	4	-	-	139
174B	19	18	438	349	2	-	57	34	8	8	-	458
180	18	16	350	267	-	1	22	40	12	-	-	342
176	48	33	654	288	24	17	56	37	27	9	-	458
179	19	15	598	242	71	-	34	18	16	75	-	456
182B	15	14	496	197	47	-	71	49	22	-	-	386
175	25	20	566	244	40	10	9	18	6	-	-	327
14E-177	31	24	473	248	51	-	15	10	10	3	-	337
Nebraska:												
184	34	32	415	245	54	-	13	14	4	-	2	332
185	27	20	712	354	83	-	18	10	9	-	47	521
Montana:												
137A	21	18	396	221	46	-	-	26	-	-	-	293
119B	21	16	744	390	86	22	2	6	-	-	-	506
118	22	21	392	271	35	-	5	9	-	-	-	320
113	58	47	755	371	75	9	2	10	-	-	-	467
114	52	44	557	370	71	-	3	3	-	-	-	447
115	30	26	1094	497	124	-	-	5	-	-	-	626
116	41	36	509	221	58	-	-	2	-	-	-	281
87D	8	8	525	332	11	-	7	40	-	-	-	390
88A	28	24	478	354	56	-	2	5	-	-	-	417
120	15	13	662	332	111	-	-	3	2	-	-	448
Wyoming:												
146A	34	29	690	554	99	2	4	2	7	-	-	668
Total or average:	961	835	534	303	45	3	17	19	6	3	1	397

Table 7. - Estimated normal annual hours of use of tractors on work of different kinds by type-of-farming areas, Northern Great Plains -
Continued

Continued										
State	Custom work									
and	Farms	Crop								
type-of-	Tractors	having	area	Prepare						Total
farming	tract-	per	and	Combine	Bind	Thresh	Corn	Total	work	
areas	ors	farm	plant	grain	grain	grain	harvest			
	Number	Number	Acres	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Minnesota:										
225A	21	20	325	-	11	-	7	-	18	265
226	4	4	308	-	-	-	-	-	-	291
225D	12	11	404	-	-	-	-	-	-	299
227A	18	15	287	-	-	-	16	-	16	329
227B	11	10	271	-	-	2	22	-	22	348
No. Dak.:										
225B	11	8	551	-	-	-	-	-	-	401
173	17	16	456	-	-	-	16	5	21	457
174A	37	34	465	1	-	-	4	-	-	374
168	22	22	686	-	-	-	-	-	-	516
169	25	21	594	1	-	-	1	-	2	342
172	22	22	425	-	2	9	-	-	11	342
170	25	24	282	1	-	-	2	-	3	197
171	39	34	506	6	6	-	-	-	12	357
136	57	50	503	-	1	-	-	-	1	375
139	17	16	505	-	1	-	-	-	1	425
166	34	33	552	-	-	-	2	-	2	374
So. Dak.:										
181	16	14	412	-	-	-	39	12	51	416
182A	7	7	236	-	-	-	-	-	-	139
174B	19	18	438	6	-	-	-	-	6	464
180	18	16	350	-	1	-	6	-	7	349
176	48	33	654	6	-	-	3	-	9	467
179	19	15	598	4	6	-	-	-	10	466
182B	15	14	496	3	-	-	-	-	3	389
175	25	20	566	-	1	-	-	-	1	328
142A-177	31	24	473	5	8	3	-	-	16	355
Nebraska:										
184	34	32	415	-	9	-	-	-	9	341
185	27	20	712	-	2	-	-	-	2	523
Montana:										
137A	21	18	396	-	6	-	-	-	6	299
119B	21	16	744	-	-	-	10	-	10	516
118	22	21	392	-	-	-	-	-	-	320
113	58	47	755	-	2	-	-	-	2	469
114	52	44	557	-	13	-	-	-	13	460
115	30	26	1094	-	-	-	-	-	-	626
116	41	36	509	1	1	-	2	-	4	285
87D	8	8	525	-	-	-	-	-	-	390
88A	28	24	478	-	-	-	-	-	-	417
120	15	13	662	-	3	-	-	-	3	451
Wyoming:										
146A	34	29	690	-	2	-	-	-	2	670
Total or										
average:	961	835	534	1	3	-	3	-	7	404

threshing grain with a combine. Custom work was of minor importance, being mainly harvesting and threshing grain, either with the combined harvester-thresher or harvesting with a binder and threshing with a stationary thresher. The total work for tractors of all sizes amounted to an annual average of 404 hours per tractor per year of which 98 percent was home work and 2 percent custom work.

The work of tractors in the Pacific Northwest was almost entirely that of preparation of seedbed and planting of grain crops and harvesting with a combined harvester-thresher. The total work for tractors of all sizes amounted to an average of 585 hours per tractor per year of which 96 percent was home work and 4 percent was custom work.

ANNUAL HOURS OF USE OF TRACTORS OF DIFFERENT TYPES AND SIZES

In the Northern Great Plains the work of general purpose tractors (table 9) amounted to an average of 458 hours per tractor per year; for ordinary high-wheel tractors it was 392 hours and for track-laying tractors, 760 hours. The greater annual use of the general purpose tractor as compared with the ordinary high-wheel tractor was mainly accounted for by its use in cultivating row crops. The large number of days of annual use of the track-laying tractor was mainly because of the fact that this type of tractor was used almost exclusively on farms of the largest crop acreages.

Table 9. - Estimated normal annual hours of use of tractors of different types and sizes, Northern Great Plains

Type of tractor	Size of tractor (Drawbar horsepower)	Annual use of tractor Hours
General purpose	9 - 12	450
	15	635
	Average	458
Ordinary high-wheel	8 - 12	329
	15 - 17	407
	18 - 21	383
	22 - 25	484
	26 - 28	439
	35 - 40	443
	Average	392
Track-laying	20	617
	25	584
	39	1277
	50	1124
	Average	760

In the Pacific Northwest the work of ordinary high-wheel tractors amounted to an average of 373 hours per tractor per year; and for track-laying tractors it was 657 hours per tractor per year, table 10. As in the Northern Great Plains, the lesser amount of work done annually by high-wheel tractors than with track-laying tractors was largely because of the fact that the high-wheel tractor was used principally on the small to medium sized farms.

Table 10. - Estimated normal annual hours of use of tractors of different types and sizes, Pacific Northwest

Type of tractor	Size of tractor (Drawbar horsepower)	Annual use of tractor Hours
Ordinary high-wheel	10	186
	15	402
	18	515
	20	803
	22	410
	26	224
Average		373
Track-laying	20	520
	25	671
	39	715
	50	703
Average		657

The distribution of tractors of different types and sizes in the Northern Great Plains by hours used annually (table 11) shows that 71 percent were used 500 hours or less; 19 percent were used from 501 to 750 hours; whereas only 10 percent were used over 750 hours per year. In the Pacific Northwest 58 percent of the high-wheel tractors were used 400 hours or less; 37 percent were used from 401 to 800 hours and only 5 percent were used more than 800 hours annually. Thirty-one percent of the track-laying tractors were used 400 hours or less; 43 percent were used 401 to 800 hours and 26 percent were used more than 800 hours annually, table 12.

COST OF USING TRACTORS

In presenting this information the various items of cost are treated separately and reported in quantity factors wherever possible, since costs expressed as money units are subject to considerable change especially during periods of wide price fluctuations. The items which have been considered as operating cost are fuels, lubricants, repairs, depreciation, and interest.

Hours used annually	General purpose	Ordinary high-wheel	Track-laying	Total tractors
	9-12 : 15 : 8-12 : 15-17 : 18-21 : 22-25 : 26-28 : 35-40 :	20 : 25 : 39 : 50 :		
	H.P. : H.P. : H.P. : H.P. : H.P. : H.P. : H.P. : H.P. :	H.P. : H.P. : H.P. : H.P. : H.P. : H.P. : H.P. : H.P. :		
	Num-ber : Num-ber : Num-ber : Num-ber : Num-ber : Num-ber : Num-ber : Num-ber :	Num-ber : Num-ber : Num-ber : Num-ber : Num-ber : Num-ber : Num-ber : Num-ber :		
Under 50	2 : 4 : 3 : 2 :	2 : 2 :		13
51 to 100	5 : 14 : 20 : 7 :	2 : 2 :	1 :	49
101 to 150	2 : 16 : 23 : 14 :	3 : 1 :		59
151 to 200	4 : 32 : 48 : 12 :	3 : 2 :	1 :	102
201 to 250	6 : 17 : 45 : 15 :	2 : 2 :	1 :	87
251 to 300	7 : 11 : 44 : 13 :	2 : 1 :		78
301 to 350	9 : 17 : 42 : 16 :	4 : 3 :		92
351 to 400	10 : 7 : 44 : 10 :	1 : 4 :	1 :	78
401 to 450	9 : 1 : 39 : 6 :	3 : 3 :		70
451 to 500	2 : 10 : 27 : 7 :	7 : 3 :		56
501 to 550	5 : 10 : 25 : 12 :	3 : 4 :		59
551 to 600	1 : 1 : 3 : 23 :	1 : 1 :	2 :	34
601 to 650	6 : 6 : 27 : 3 :	1 : 1 :		43
651 to 700	5 : 1 : 11 : 3 :	1 : 1 :		30
701 to 750	1 : 5 : 7 : 3 :	2 : 2 :		14
751 to 800	3 : 1 : 7 : 4 :	1 : 1 :		20
801 to 850	1 : 1 : 7 : 3 :	1 : 1 :		16
851 to 900	3 : 1 : 7 : 3 :	1 : 1 :		13
901 to 950	1 : 2 : 4 : 1 :	2 : 1 :	1 :	9
951 to 1000	1 : 2 : 4 : 1 :	1 : 1 :		9
1001 to 1050	1 : 2 : 4 : 1 :	1 : 1 :		7
1051 to 1100	1 : 1 : 1 : 1 :	1 : 1 :	1 :	4
1101 to 1150	1 : 1 : 2 : 1 :	1 : 1 :		5
1151 to 1200	1 : 1 : 1 : 1 :	1 : 1 :		1
1201 to 1250	1 : 1 : 1 : 1 :	1 : 1 :		1
1251 to 1300	1 : 1 : 1 : 1 :	1 : 1 :	1 :	4
1301 to 1350	1 : 1 : 1 : 1 :	1 : 1 :		3
1351 to 1400	1 : 1 : 1 : 1 :	1 : 1 :		1
1401 to 1450	1 : 1 : 1 : 1 :	1 : 1 :		1
1451 to 1500	1 : 1 : 1 : 1 :	1 : 1 :		1
1501 and over	1 : 1 : 1 : 1 :	1 : 1 :	1 :	3
Total	86 : 4 : 173 : 471 : 137 :	36 : 35 : 2 : 4 :	8 : 1 : 4 :	961

Table 12. - Distribution of tractors of different types and sizes by hours, used annually, Pacific Northwest, 1933

Hours used annually	Size (Drawbar horsepower)											Total tractors
	Ordinary high-wheel						Track-laying					
	10	15	18	20	22	26	20	25	30	50		
	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.		
	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	
50 and less								5			5	
51 - 100	3	1				1	1		1		7	
101 - 150	1	3					1	1			6	
151 - 200	1	4	1					3		1	10	
201 - 250		1					3	1	1	1	7	
251 - 300	1	1					3	3		2	10	
301 - 350	1						1	2		1	5	
351 - 400		2			2	1		6	1		12	
401 - 450	1	1					1	4	1	2	10	
451 - 500		1			1			3			5	
501 - 550		2	1				1	5		2	11	
551 - 600		3					1	4	1		9	
601 - 650		1	1					1	1		4	
651 - 700		1					2	3			6	
701 - 750							1	8	1	1	11	
751 - 800		1	1				1	4		4	11	
801 - 850				1			1	1		3	6	
851 - 900								2			2	
901 - 950								2			2	
951 - 1000							1	1		4	6	
1001 - 1050		1								1	2	
1051 - 1100								1			1	
1101 - 1150												
1151 - 1200								2			2	
1201 - 1250								3	1		4	
1251 - 1300												
1301 - 1350												
1351 - 1400												
1401 - 1450												
1451 - 1500												
1501 and over							1	6	1	1	9	
Total	8	23	4	1	3	2	19	71	9	23	133	

The quantities and cost of these items per tractor per year are averages which were computed by dividing the total expense for a given item of cost by the total number of tractors included in the study. The yearly cost divided by the total number of 10-hour days a tractor was used during the year is the average cost of operation per day. The hours of work per tractor per year represents the normal rather than the hours actually used in 1933.

Tables 14 to 17 give the itemized cost of operating tractors of different types and sizes in the Northern Great Plains and tables 19 to 22 present corresponding data for the Pacific Northwest. The quantities of fuel and cylinder oil shown in tables 13 and 18 are based on the normal annual consumption rather than on the quantities used in 1933. The cost of fuel and lubricants shown in tables 14 and 19 is based on the normal annual consumption of fuel, oils, and grease at prevailing 1933 prices.

The cash repairs shown in tables 15 and 20 represent normal tractor repair charges rather than actual expenditures in 1933. The cost of hired and other labor on tractor repairs reflects the normal annual days of labor at prevailing 1933 rates for labor.

Depreciation as shown in tables 16 and 21 was computed by dividing the first cost of the tractor by the estimated years of useful life. Interest shown in these tables was charged at 6 percent of one-half of the average first cost of the tractor.

For the ordinary high-wheel tractor in the Northern Great Plains, fuel and lubricants constituted 44.3 percent of the total annual cost of operating tractors; cash repairs, 10.4 percent; hired labor on repairs, 0.1 percent; other labor, 1.7 percent; depreciation, 33.3 percent; and interest, 10.2 percent.

In the Pacific Northwest the percentage distribution of the total cost for track-laying tractors was as follows: Fuel and lubricants, 47.3 percent; cash repairs, 11.1 percent; hired labor, 0.3 percent; other labor, 1.5 percent; depreciation, 30.4 percent; and interest 9.4 percent.

Tractor operators who have no indebtedness on their tractors may consider fuel and lubricants and cash repairs including hired labor on repairs as cash costs and operator and family labor on repairs, depreciation, and interest as non-cash costs. For tractor operators who have little if any equity in their tractors the cash outlay will include practically all expense except operator and family labor on repairs.

Table 13. - Motor fuels and cylinder oil consumed by tractors of different types and sizes, Northern Great Plains 1/

GENERAL PURPOSE TRACTORS									
Size of tractor (drawbar horsepower)		: Gasoline <u>2/</u>	: Distillate <u>2/</u>	: Kerosene <u>2/</u>	: Total motor fuel <u>2/</u>			: Cylinder oil	
		: Per tractor	: Per tractor	: Per tractor	: Per tractor	: Per tractor		: Per tractor	
		: per year	: per year	: per year	: per year	: per hour day		: per year	
	: Number	: Gallons	: Gallons	: Gallons	: Gallons	: Gallons		: Gallons	: Gallons
9 - 12	86	157	611	76	844	18.8		27.6	.61
15	4	40	1226		1266	19.9		40.5	.64
Total or average	90	152	638	73	863	18.8		28.2	.61
ORDINARY HIGH-WHEEL TRACTORS									
8 - 12	173	225	381	46	652	19.8		23.2	.71
15 - 17	471	347	541	2	890	21.9		40.4	.99
18 - 21	137	640	573	8	1221	31.9		38.3	1.00
22 - 25	36	719	944		1663	34.4		57.2	1.18
26 - 28	35	926	694		1620	36.9		50.5	1.15
35 - 40	2	770	1002		1772	40.0		53.2	1.20
Total or average	854	410	538	12	959	24.5		37.7	.96
TRACK-LAYING TRACTORS									
20	4	1192	524		1716	27.8		59.8	.97
25	8	1132	995		2127	36.4		70.2	1.20
39	1	5300			5300	41.5		95.8	.75
50	4	6728			6728	59.8		149.0	1.33
Total or average	17	2708	592		3300	40.2		87.8	1.16

1/ Based on the normal consumption of motor fuels and cylinder oil.2/ Average of all tractors.

Table 14. - Cost of motor fuels and lubricants consumed by tractors of different types and sizes, Northern Great Plains 1/

GENERAL PURPOSE TRACTORS

	: Gaso- :line 2/	:Distil- :late 2/	: Kero- :sene 2/	: Total : motor fuels 2/		: Cylinder oil :per 10-		: Other oils : and grease :per 10-	
Size of tractor (drawbar horse-power)	Per tractor per year	Per tractor per year	Per tractor per year	Per tractor per year	Per tractor per 10-hour day of use	Per tractor per 10-hour day of use	Per tractor per 10-hour day of use	Per tractor per 10-hour day of use	Per tractor per 10-hour day of use
	:Dollars	:Dollars	:Dollars	:Dollars	:Dollars	:Dollars	:Dollars	:Dollars	:Dollars
9 - 12	26.79	53.15	7.65	87.59	1.95	16.39	.36	9.00	.20
15	7.04	102.12		109.16	1.72	23.67	.37	15.24	.24
Average	25.91	55.33	7.31	88.55	1.93	16.71	.36	9.27	.20

ORDINARY HIGH-WHEEL TRACTORS

8 - 12	33.50	34.49	4.98	72.97	2.22	13.59	.41	6.58	.20
15 - 17	56.04	70.55	5.16	131.75	3.24	25.28	.62	9.77	.24
18 - 21	100.52	51.24	.71	152.47	3.98	23.68	.62	9.58	.25
22 - 25	114.54	90.12		204.66	4.23	34.87	.72	12.10	.25
26 - 28	151.02	63.12		214.14	4.84	33.38	.76	11.41	.26
35 - 40	122.00	80.10		202.10	4.56	34.58	.78	12.40	.28
Average	65.12	60.69	3.97	129.78	3.31	23.41	.60	9.26	.24

TRACK-LAYING TRACTORS

20	142.46	36.68		179.14	2.90	37.62	.61	61.70	1.00
25	184.84	75.64		260.48	4.47	43.17	.74	64.24	1.10
39	848.00			848.00	6.64	71.84	.56	146.86	1.15
50	1101.31			1101.31	9.80	107.59	.96	146.12	1.30
Average	429.52	44.22		473.74	6.23	58.71	.77	87.77	1.15

1/ Based on the normal consumption of fuel, oil, and grease, at prices paid in 1933.

2/ Average of all tractors.

Table 15. - Cost of cash repairs and labor on repairs for tractors of different types and sizes, Northern Great Plains

GENERAL PURPOSE TRACTORS									
Size of tractor (drawbar horsepower)	Cash repairs 1/			Farm labor on repairs			Cost 3/		
	:Tractors:Reports:		:Owner and family:		:Hired:		:		
	:Per tractor:Reports:		:Per tractor:Reports:		:Per tractor:Reports:		:Per tractor:		
	:per year:		:per year 2/:		:per year 2/:		:per year 2/:		
	: Number	: Number	: Dollars	: Number	: Days	: Number	: Days	: Dollars	
9 - 12	: 86	: 86	: 22.83	: 80	: 2.7	: 17	: .34	: 5.69	
15	: 4	: 4	: 31.25	: 4	: 3.0	: -	: -	: 6.00	
Total or average	: 90	: 90	: 23.20	: 84	: 2.7	: 17	: .34	: 5.70	

ORDINARY HIGH-WHEEL TRACTORS									
8 - 12	: 173	: 173	: 21.51	: 155	: 2.6	: 27	: .30	: 5.32	
15 - 17	: 471	: 471	: 41.62	: 444	: 3.2	: 75	: .29	: 6.91	
18 - 21	: 137	: 137	: 42.43	: 129	: 3.7	: 18	: .26	: 7.64	
22 - 25	: 36	: 36	: 44.36	: 35	: 3.4	: 3	: .14	: 6.94	
26 - 28	: 35	: 35	: 48.86	: 34	: 3.7	: 3	: .14	: 7.49	
35 - 40	: 2	: 2	: 20.00	: 2	: 3.5	: -	: -	: 6.50	
Total or average	: 854	: 854	: 38.04	: 799	: 3.2	: 126	: .27	: 6.73	

TRACK-LAYING TRACTORS									
20	: 4	: 4	: 46.25	: 4	: 3.5	: 1	: .25	: 7.12	
25	: 8	: 8	: 80.00	: 8	: 5.6	: 1	: .20	: 15.06	
39	: 1	: 1	: 200.00	: 1	: 15.0	: -	: -	: 37.50	
50	: 4	: 4	: 75.00	: 4	: 11.0	: -	: -	: 26.25	
Total or average	: 17	: 17	: 77.94	: 17	: 7.5	: 2	: .16	: 17.14	

1/ Normal cash outlay for new parts and skilled labor on repairs in machine shops.

2/ Average of all tractors.

3/ Represents the value of the normal time spent on tractor repair work at 1933 rates for labor.

Table 16. - Average first cost, age in 1933, years of useful life, depreciation and interest charges for tractors of different types and sizes, Northern Great Plains

GENERAL PURPOSE TRACTORS

Size of tractor (drawbar horsepower)	Number	Average first cost	Average age in 1933	Useful life	Depreciation per tractor per year 1/	Interest per tractor per year 2/
		Dollars	Years	Years	Dollars	Dollars
9 - 12	86	897	4.7	10.1	88.81	26.90
15	4	1044	1.5	8.2	127.32	31.31
Total or average	90	904	4.6	10.0	90.40	27.10

ORDINARY HIGH-WHEEL TRACTORS

8 - 12	173	836	6.1	10.6	78.86	25.08
15 - 17	471	1273	5.8	10.3	123.59	38.20
18 - 21	137	1440	5.2	9.9	145.45	43.19
22 - 25	36	1389	4.6	8.8	157.84	41.68
26 - 28	35	1857	5.1	10.0	185.70	55.71
35 - 40	2	2688	3.5	10.0	268.80	80.62
Total or average	854	1243	5.7	10.2	121.86	37.31

TRACK-LAYING TRACTORS

20	4	1711	4.8	10.5	162.95	51.34
25	8	2344	4.8	8.9	319.55	85.31
39	1	3000	5.0	10.0	300.00	90.00
50	4	4921	4.8	12.0	410.08	147.64
Total or average	17	3075	4.8	10.1	304.46	32.26

1/ Computed by dividing the first cost of the tractor by the estimated years of useful life.

2/ Charged at the rate of 6 percent of one-half of the first cost of the tractor.

Table 17. - Total cost per year and per 10-hour day of use for tractors of different types and sizes, Northern Great Plains, 1933 ^{1/}

GENERAL PURPOSE TRACTORS							
Size of tractor (drawbar horsepower)	: Tractors	: use of tractor	Cost				
			Annual		Per year		Per 10-hour day of use
			Excluding interest	Including interest	Excluding interest	Including interest	
	: Number	: Hours	: Dollars	: Dollars	: Dollars	: Dollars	
9 - 12	: 86	: 450	: 230.31	: 257.21	: 5.12	: 5.72	
15	: 4	: 635	: 312.64	: 343.95	: 4.92	: 5.42	
Total or average	: 90	: 458	: 233.83	: 260.93	: 5.11	: 5.70	

ORDINARY HIGH-WHEEL TRACTORS							
8 - 12	: 173	: 329	: 198.83	: 223.91	: 6.04	: 6.81	
15 - 17	: 471	: 407	: 338.92	: 377.12	: 8.33	: 9.27	
18 - 21	: 137	: 383	: 331.25	: 424.44	: 9.95	: 11.08	
22 - 25	: 36	: 484	: 460.77	: 502.45	: 9.52	: 10.38	
26 - 28	: 35	: 439	: 500.98	: 556.69	: 11.41	: 12.68	
35 - 40	: 2	: 443	: 544.38	: 625.00	: 12.29	: 14.11	
Total or average	: 854	: 392	: 329.08	: 366.39	: 8.39	: 9.35	

TRACK-LAYING TRACTORS							
20	: 4	: 617	: 494.78	: 546.12	: 8.02	: 8.85	
25	: 8	: 584	: 782.50	: 867.81	: 13.40	: 14.86	
30	: 1	: 1277	: 1604.20	: 1694.20	: 12.56	: 13.27	
50	: 4	: 1124	: 1866.35	: 2013.99	: 16.60	: 17.92	
Total or average	: 17	: 760	: 1019.76	: 1112.02	: 13.42	: 14.63	

^{1/} Based on normal consumption of fuel, oils, and grease at prices paid in 1933, normal outlay for cash repairs, normal days of labor on repairs, at 1933 rates for labor. Depreciation was computed by dividing the first cost of the tractor by the estimated years of useful life. Interest was charged at 6 percent of one-half of the average first cost of the tractor.

Table 18. - Motor fuels and cylinder oil consumed by tractors of different types and sizes, Pacific Northwest 1/

ORDINARY HIGH-WHEEL TRACTORS							
		Gasoline <u>2/</u>	Distillate <u>2/</u>	Total motor fuel <u>2/</u>	Cylinder oil		
		Per tractor	Per tractor	Per tractor	Per tractor	Per tractor	Per tractor
		per 10-	per 10-	per 10-	per 10-	per 10-	per 10-
		hour day	hour day	hour day	hour day	hour day	hour day
		of use	of use	of use	of use	of use	of use
Size of tractor (drawbar horsepower)	Number	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
10	8	276	46	322	17.3	11.2	.60
15	23	988	117	1105	27.5	39.4	.98
18	4	1600		1600	31.1	43.2	.84
20	1	2610		2610	32.5	80.0	1.00
22	3	1410		1410	34.4	33.3	.81
26	2	810		810	36.2	17.5	.80
Total or average	41	971	74	1045	28.0	33.8	.87

TRACK-LAYING TRACTORS							
20	19	1106		1106	21.3	36.6	.70
25	71	2140		2140	31.9	70.1	1.04
39	9	2709		2709	37.9	79.8	1.12
50	23	3897		3897	55.4	100.5	1.43
Total or average	122	2352		2352	35.8	71.3	1.09

1/ Based on normal consumption of motor fuels and cylinder oil.

2/ Average of all tractors.

Table 19. - Cost of motor fuels and lubricants consumed by tractors of different types and sizes, Pacific Northwest 1/

ORDINARY HIGH-WHEEL TRACTORS									
Size of tractor (drawbar horsepower)	: Gasoline 2/	: Distillate 2/	: Total motor fuels 2/	:	: Cylinder oil	:	: Other oils and grease	:	:
	: Per tractor	: Per tractor	: Per tractor	: Per tractor	: Per tractor	: Per tractor	: Per tractor	: Per tractor	: Per tractor
	: per year	: per year	: per year	: 10-hour day of use	: per year	: 10-hour day of use	: per year	: 10-hour day of use	: per year
	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars	: Dollars
10	: 38.50:	: 3.64:	: 42.14:	: 2.27:	: 7.47:	: .40:	: 3.35:	: .18:	
15	: 147.66:	: 9.46:	: 157.12:	: 3.91:	: 20.62:	: .51:	: 9.65:	: .24:	
18	: 279.54:	:	: 279.54:	: 5.43:	: 30.20:	: .59:	: 12.89:	: .25:	
20	: 365.40:	:	: 365.40:	: 4.55:	: 38.40:	: .48:	: 20.08:	: .25:	
22	: 224.07:	:	: 224.07:	: 5.47:	: 19.73:	: .48:	: 10.66:	: .26:	
26	: 139.12:	:	: 139.12:	: 6.21:	: 13.58:	: .60:	: 6.06:	: .27:	
Total or average	: 149.71:	: 6.02:	: 155.73:	: 4.18:	: 17.01:	: .51:	: 8.89:	: .24:	

TRACK-LAYING TRACTORS									
20	: 169.32:	:	: 169.32:	: 3.26:	: 22.90:	: .44:	: 52.00:	: 1.00:	
25	: 333.19:	:	: 333.19:	: 4.97:	: 40.75:	: .61:	: 74.06:	: 1.10:	
39	: 431.85:	:	: 431.85:	: 6.04:	: 54.60:	: .76:	: 82.23:	: 1.15:	
50	: 570.59:	:	: 570.59:	: 8.12:	: 60.00:	: .85:	: 91.42:	: 1.30:	
Total or average	: 359.70:	:	: 359.70:	: 5.47:	: 42.62:	: .65:	: 74.24:	: 1.13:	

1/ Based on normal consumption of motor fuels and lubricants at prices paid in 1933.

2/ Average of all tractors.

Table 20. - Cost of cash repairs and labor on repairs for tractors of different types and sizes, Pacific Northwest

ORDINARY HIGH-WHEEL TRACTORS									
Size of tractor (drawbar horsepower)	Cash repairs 1/		Owner and family:		Farm labor on repairs		Hired		Cost 3/
	Tractors	Reports	tractor	Reports	tractor	Reports	tractor	tractor	
	per tractor		per tractor		per tractor		per tractor		per tractor
	year		year 2/		year 2/		year 2/		year 2/
	Number	Number	Dollars	Number	Days	Number	Days	Dollars	
10	8	8	15.62	7	9.1	2	1.9	19.18	
15	23	23	41.30	20	3.7	4	.5	9.51	
18	4	4	26.25	3	3.0	2	1.0	9.38	
20	1	1	100.00	1	5.0	1	5.0	22.50	
22	3	3	75.00	3	2.7	-	-	6.50	
26	2	2	62.50	2	1.0	-	-	2.38	
Total or average	41	41	39.76	36	4.5	9	.9	11.13	

TRACK-LAYING TRACTORS									
20	19	19	77.37	19	3.4	5	.6	10.46	
25	71	71	107.65	61	6.0	19	1.3	16.93	
39	9	9	76.11	9	5.2	-	-	12.61	
50	23	23	166.50	20	10.7	4	1.6	27.96	
Total or average	122	122	111.70	109	6.4	28	1.2	17.68	

1/ Normal cash outlay for new parts and skilled labor on repairs in machine shops.

2/ Average of all tractors.

3/ Represents the value of the normal time spent on tractor repair work at 1933 rates for labor.

Table 21. - Average first cost, age in 1933, years of useful life, depreciation and interest charges for tractors of different types and sizes, Pacific Northwest

ORDINARY HIGH-WHEEL TRACTORS						
Size of tractor: (Drawbar horsepower)	Tractors	Average first cost	Average age in 1933	Useful life	Depreciation per tractor per year 1/	Interest per tractor per year 2/
	Number	Dollars	Years	Years	Dollars	Dollars
10	8	1272	8.9	14.0	90.90	38.16
15	23	1305	4.8	9.4	138.72	39.15
18	4	1550	5.5	10.2	151.96	46.50
20	1	1450	4.0	8.0	181.31	43.50
22	3	1513	4.3	9.3	162.69	45.40
26	2	1718	2.5	8.0	214.75	51.52
Total or average	41	1361	5.5	10.3	132.14	40.84

TRACK-LAYING TRACTORS						
20	19	2032	4.5	9.2	220.86	60.96
25	71	2933	5.2	10.5	279.33	87.99
39	9	3086	2.5	9.2	335.43	92.58
50	23	4761	6.7	11.1	428.92	142.83
Total or average	122	3149	5.2	10.3	305.75	94.46

1/ Computed by dividing the first cost of the tractor by the estimated years of useful life.

2/ Charged at the rate of 6 percent of one-half of the first cost of the tractor.

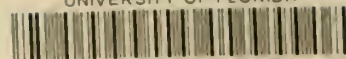
Table 22. - Total cost per year and per 10-hour day of use for tractors of different types and sizes, Pacific Northwest, 1933 ^{1/}

ORDINARY HIGH-WHEEL TRACTORS							
Size of tractor (drawbar horsepower)	Tractors	Annual use of tractor	Cost				
			Per year		Per 10-hour day of use		
			Excluding interest	Including interest	Excluding interest	Including interest	
	Number	Hours	Dollars	Dollars	Dollars	Dollars	
10	8	186	178.66	216.82	9.60	11.65	
15	23	402	376.92	416.07	9.38	10.35	
18	4	515	510.22	556.72	9.95	10.81	
20	1	803	727.69	771.19	9.06	9.60	
22	3	410	498.65	544.05	12.16	13.27	
26	2	224	438.39	489.91	19.57	21.87	
Total or average	41	373	366.66	407.50	9.83	10.92	

TRACK-LAYING TRACTORS							
20	19	520	552.91	613.87	10.63	11.80	
25	71	671	851.91	939.90	12.70	14.00	
39	9	715	992.83	1085.41	13.89	15.18	
50	23	703	1345.39	1488.22	19.14	21.17	
Total or average	122	657	911.67	1006.13	13.88	15.31	

^{1/} Based on normal consumption of fuels and lubricants, at prices paid in 1933, normal outlay for cash repairs, and normal days of labor on repairs, at 1933 rates for labor. Depreciation was computed by dividing the first cost of the tractor by the estimated years of useful life. Interest was charged at 6 percent of one-half of the average first cost of the tractor.

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